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HEALTH DEPARTMENT

CITY OF BOSTON

REPORT

OF

MILK INSPECTOR

FOR THE YEAR 1907-1908

[Reprinted from the Thirty-sixth Annual Report of the Health Department]

BOSTON
MUNICIPAL PRINTING OFFICE
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REPORT OF MILK INSPECTOR.

Bureau of Milk Inspection,
30 Huntington Avenue, Boston, Mass.

To the Board of Health:

Gentlemen, — I have the honor to submit the following report for the year ending January 31, 1908:

The total number of samples collected and examined was 18,151, as follows:

Number of samples of milk from wagons	6,166
Number of samples of milk from stores	5,311
Number of samples brought in by citizens	217
Number of samples of milk (bacteriological)	4,609
Total milk samples	16,303
Number of samples of vinegar	1,120
Number of samples of butter, cheese and oleomargarine,	728
Total samples	18,151

The last year has been prolific of agitation of the milk question, the principal points at issue being those of standard and price. The consideration given the price problem within the last six months resulted in materially lessening, temporarily at least, the consumption of milk. It has been estimated by competent authorities that the use decreased so that the daily amount consumed was 50,000 quarts (about 20 per cent.) below the normal quantity. It is a fact that the business of some dealers diminished, in the poorer sections of the city, over 30 per cent. This resulted from the cessation or curtailing of purchases of milk by consumers. This limited demand for milk was felt alike by wholesale and retail dealers.

There has been a gradual recovery of this lost trade, but the amount now consumed is much below normal. While it is not the province of this report to discuss the price of milk, there were some features connected with the traffic which may be properly noted. At no time in recent years has the labor problem been of such prominence in connection with milk production as during the last year. By reason of the

independence of laborers and the high wages demanded, a condition of such magnitude resulted that many dairymen relinquished the whole or a part of their business. Undoubtedly the high price of food materials for cattle was also an important factor in determining this action. In the majority of instances, farmers sold such a portion of their stock that the remaining animals could be cared for without outside assistance. In a few cases, however, farmers abandoned the production of milk entirely, despite the fact that they were under contract to supply milk to wholesalers for definite periods.

There can be little doubt that these adverse conditions, combined with the trend of local agitation, have neither assisted in obtaining a cleaner supply or benefited the quality chemically. The effect was to divert the attention of consumers and of those engaged in supplying milk to issues other than those of cleanliness and quality, consequently efforts for improvement met, at least, a temporary check. To benefit consumers discussions relating to the milk subject should be directed to the possible dangers from dirty milk and the desirability of obtaining and caring for the clean variety, which should be the product of healthy animals.

Milk Standard.

As a whole the milk which came to the city during the past year was of fair quality, judged from the chemical basis. The question of a proper standard has received such bountiful consideration from outside sources that it was deemed advisable to ascertain the quality of the milk sold in this city by those milkmen who are supplying their customers with the product of their own cows. Some of these herds are kept within the city borders, while others are in nearby towns. In order that the milk might be representative of a dairy herd, the samples included in this list are from dairies of three or more cows. Most of the samples were taken from the teams as the milk was being delivered, but with an occasional dealer, where this was impossible, specimens were procured at the dairy. In a few instances where two samples were taken from a dealer the results were averaged. The figures, which are self-explanatory, may be found in the following table:

Results from Examination of Milk Produced by Milkmen Licensed in Boston who Peddle the Product of their own Dairies.

Samples taken from Wagons.

Number of Cows.	Per cent. Total Solids.	Per cent. Solids, not Fat.	Per cent. of Fat.	Number of Cows.	Per cent. Total Solids.	Per cent. Solids. not Fat.	Per cent. of Fat.
11.....	13.03	9.33	3.70	26.....	12.65	9.05	3.60
5.....	13.59	9.79	3.80	12.....	13.60	9.20	4.40
25.....	12.78	8.98	3.80	30	13.28	9.28	4.00
30.....	12.91	8.76	4.15	180.....	13.18	8.98	4.20
20.....	12.20	8.90	3.30	17.....	13.24	9.24	4.00
17.....	13.40	9.00	4.40	30.....	15.07	9.57	5.50
4	13.21	9.11	4.10	6.....	12.48	8.88	3.60
3.....	12.68	9.03	3.65	3.....	13.17	9.22	3.95
30.....	12.49	8.87	3.62	18.....	13.18	9.18	4.00
4.....	13.73	9.53	4.20	7.....	13.10	9.15	3.95
8.....	14.37	9.42	4.95	3.....	13.02	8.92	4.10
7.....	13.48	8.78	4.70	14.....	12.93	9.33	3.60
4.....	14.73	10.15	4.58	8.....	12.64	9.24	3.40
30.....	13.45	9.45	4.00	7.....	13.61	9.03	4.58
125.....	12.85	9.05	3.80	3.....	13.16	8.86	4.30
34.....	13.58	9.38	4.20	82.....	13.57	8.97	4.60
90.....	13.10	9.20	3.90	6.....	13.02	9.32	3.70
45.....	13.45	8.85	4.60	8.....	13.16	9.36	3.80
47.....	13.43	9.18	4.25	31.....	13.74	9.54	4.20
20.....	13.74	9.14	4.60	250.....	12.66	8.66	4.00
16.....	12.71	9.11	3.60	9.....	13.90	9.30	4.60
200.....	13.61	9.41	4.20	5.....	12.33	8.33	4.00
9.....	14.10	10.25	3.85	3.....	13.61	8.96	4.65
34.....	12.75	9.15	3.60	3.....	12.98	9.08	3.90
5.....	13.51	8.91	4.60	3.....	14.07	9.67	4.40
17.....	13.14	9.29	3.85	6.....	13.28	9.38	3.90
3.....	13.32	9.27	4.05	110.....	12.52	8.92	3.60
25.....	13.24	9.34	3.90	10.....	13.36	9.06	4.30
7.....	14.05	9.40	4.65	13.....	13.21	9.01	4.20
18.....	13.32	9.62	3.70	10.....	12.72	9.09	3.63
Average for the sixty dairies.....					13.27	9.19	4.08

Number of Milk Dealers and Quantity of Milk Handled Daily.

During the year there has been a further decrease in the number of milkmen, 28 dealers having abandoned the business. In 1906, 28 wagon dealers also discontinued the sale of milk; thus at the present time the Bureau has 56 less licenses than in 1905. The licensed dealers now number 288. There was a slight decrease in the number of shops engaged in the sale of milk, 3,730 now being registered to deal in this commodity. In 1906 there were 3,746 registered establishments.

About 360,426 quarts of milk were handled daily by Boston dealers in 1907. Of this quantity, 324,386 quarts, or 90 per cent., were brought to the city by means of railroads; 31,076 quarts, or 8.62 per cent., were conveyed by dealers in adjoining towns and cities by means of teams; 4,964 quarts, or 1.38 per cent., were produced by the 579 cows located within the city limits. Forty more cows were kept in Boston during 1907 than in 1906. By comparison with 1906, the amount of railroad milk increased nearly 2 per cent., and the quantity of milk produced in the city was slightly larger, but there was a decrease of nearly 2 per cent. in the volume of milk transported by wagons.

Certified and Reasonably Clean Milk.

Boston now has three sources of certified milk, and the available daily supply amounts to 855 quarts. A new dairy has recently placed its product upon this market. All of these dairies are under the supervision of milk commissions, and the health of the cattle and of employees is of the best, and the utmost cleanliness of cattle, employees, utensils, and surroundings prevails. Temperature regulations are insisted upon, and clean, wholesome milk, with not more than 10,000 bacteria to the c.c., results. The milk is also delivered with comparative freshness.

The production of clean, cold milk involves much labor and expense, consequently dairies raising certified milk must receive and are entitled to more money for their product than is demanded for milk not produced under these exacting and commendable conditions. Certified milk deserves support; its success means much to the public health and to the movement for suppression of dirty milk supplies.

The milk commission of another medical society has given approval to certain dairies producing milk under reason-

ably clean conditions. The requirements governing the dairies from which this milk is obtained necessitate the employment of cleanliness, care, refrigeration and delivery to consumer before the milk is old. Milk of this kind is often designated as inspected milk, and it should not have more than 100,000 bacteria to the c.c. Its production involves more labor than that required for the usual type of milk, consequently those handling it are entitled to a corresponding increase in price. At present 8,950 quarts of this reasonably clean milk are being supplied to consumers in this city.

Milk Cans.

The replacing of the old style 8½-quart milk can with cans of larger size, for transporting milk by rail to this city, still continues. One concern is now bringing all of its milk into the city in 21¼-quart cans, while another company is using this unit for nearly all of its milk supply. Another firm substituted 40-quart cans for about one-half of the 8½-quart cans formerly used. One firm replaced the 8½-quart cans upon one of its cars with 21¼-quart cans. All of the contractors who use these larger units feel that such change is conducive to a better milk supply. Only one large firm is employing the small can exclusively for transporting milk from the country, but two of the small contracting concerns are still using the small cans. One of these latter contends that producers, many of whom are old men, do not take kindly to the large cans for the reason that they are heavy and difficult to handle when filled with milk.

Nearly all of the cans are now washed by contractors before they are returned to the farmer. One concern sends one-fourth of its daily 8,000 can supply to the country unwashed, but the other firms are returning all cans washed. Four of these companies state emphatically that in their opinion the washing of cans has improved their milk supply, and one firm states that present bacteriologic results could not have been obtained without washing and sterilizing cans before returning to producers. One firm is of the opinion that the supply has been bettered, but that advantage is taken of the system by producers who disclaim responsibility of rewashing cans which by unavoidable means become soiled in transit. This is a state of affairs which should not exist. No producer of milk should use a can for milk which is not in condition to be employed as a container for this fluid. The responsibility for such action is then

upon the farmer and not upon those who do the washing. Whatever the circumstances, milk cans unfit for use as holders of milk should not be filled with milk until made clean. Fairness to seller, buyer, and especially to the consumer, demand that such care be constantly exercised. One company asserts that more trouble is experienced from the condition of the milk where producers receive washed cans than where the latter are sent unwashed, and that divided responsibility does not yield the best results.

Wherever the cans are washed they should be made clean, and if the washing is done by the contractor they should be sent to the producer in the best possible condition. They should not be returned to the farmer, as was done in one instance last summer, with dirty rinsing water, a specimen of which was found to contain 780,000 bacteria to the cubic centimeter; in thirty-six hours after the first examination the number of bacteria had increased to 66,000,000 to the cubic centimeter. As there were from 30 to 80 cubic centimeters of water in the various cans, it is readily seen that this offered abundant bacterial seeding for any milk placed in these cans. The water in these cans appeared soapy, but the odor was that of sour milk.

Misuse of Milk Containers.

RUSTY CANS.

A marked improvement has been noted in the treatment of milk cans by store and restaurant keepers, and instances are now rare — by comparison with other years — where cans are used as containers of substances like kerosene oil, molasses, broken eggs, etc. Some shopkeepers are even washing the cans before returning them to milkmen. To a great extent the misuse of cans is confined to foreigners who are ignorant of the law and regulation governing this subject. A majority of the complaints brought to the attention of the Bureau were those where cans had been employed for cooking purposes, in the heating or preparation of soups, chocolate and other substances. In every instance a warning notice served to cause abandonment of this illegal practice.

Householders and those who buy milk in bottles in stores and offices are, however, in some instances failing to co-operate with the movement for preventing the misuse of milk vessels. This is manifested in their desire to purchase from shopkeepers and restaurateurs a variety of substances, and offering as containers therefor bottles used in the milk traffic. Temptation is thus placed in the way of the dealers, even

where there is a desire on the part of the latter to comply with the requirements. In many instances requests to fill these containers are refused, and oftentimes this results in loss of trade. The dealer who honors the demands of customers and misuses milk vessels violates the law and regulation. Consumers should give this clean milk vessel movement firm and consistent support, and they are unfair to dealers and to themselves when they attempt to buy in milk bottles substances other than milk. Consumers are the ones most benefited from the proper use of milk containers, and they should insist that dealers comply with the regulation rather than to give cause for its violation. In any event the burden of educating the public should not be placed upon shopkeepers. It would be well also for consumers to bear in mind that to cause or permit misuse of a milk vessel is a violation of the law which involves the purchaser as well as the shopkeeper.

The distribution of cards to shopkeepers selling milk, relative to the subject of improper use of milk vessels, has assisted materially in directing attention to the necessity for confining the employment of milk containers within proper limitations.

A number of complaints were lodged with the Bureau during the year concerning rusty cans which were being sent to the country by contractors. The can question in its connection with the milk traffic is one of great importance, involving as it does a large investment of capital, but despite this fact, and the accompanying temptation of dealers to make a can last as long as possible, rusty cans have no place in the handling of good milk. The rough surfaces offered by the rust make thorough cleaning impossible, and the use of rusty cans under any circumstances cannot fail to be harmful to milk. It may be difficult to know just where to draw the line in deciding at what point a can should be no longer used, but a safe rule to follow is to discard all cans about which there is any doubt. It is not the use, but the abuse, which too often unfits milk cans for use as containers of milk. Very little or no system is used by milkmen in looking after their cans, and as a result cans are allowed to remain with customers much longer than they should, and usually under conditions unfavorable to the life of the can and to sanitary milk. A part of this lack of oversight is due to competition and fear of displeasing and losing customers. Prompt and systematic collection of cans, and their use solely for the purpose for which they were intended, would mean better milk and extend materially the time over which

the cans could be used. But the abuse of milk cans is not confined wholly to the city. They are kept in the country by farmers, instead of being returned to the contractor, and there often used as containers for water or other liquids. The gradual displacement of the 8½-quart can for transporting milk from the country has lessened the misuse of cans by the producer materially. The cans of larger size are a prohibition against improper use by reason of their great weight and unwieldiness when filled.

Investigation of Complaints.

During the year the Bureau was called upon to investigate a variety of complaints, some being lodged by citizens. They indicated that despite the advances made in the handling of milk abuses still exist, and that slovenly methods and carelessness are difficult of extermination.

These complaints included the transportation of milk by train in cans minus stoppers, but covered with burlap or with newspaper. In some instances the newspaper was broken and allowed the train dirt to come in contact with the milk. At another place of business the milk drainings and wash water from the cans and bottles were allowed to collect upon the ground underneath the building where the milk was handled; under the influence of summer temperature the odor from this stagnant pool became extremely noxious. One milkman was found washing milk bottles in tubs in which the family washing was done. At one dairy the milk pails were being washed with dirty water and by means of dirty clothes. The wash water was either from a filthy pond or from a well underneath the barn. Water from the cow stalls was dripping down on the cellar floor within a few feet of this well. There was dirt on the surface of the water, and in the well cans of milk were suspended. The temperature of the water was 60 degrees Fahrenheit, while that of the milk after being in the water several hours was 64 degrees Fahrenheit. Other cans of milk were in a box which took the place of an ice chest. The cans were submerged in water to about half their height, and resting on two of the cans was a small piece of ice. This milk was awaiting bottling, and had been ten to twelve hours cooling to 63 degrees Fahrenheit. No bottles were at hand, but the proprietor was away endeavoring to secure a supply. Milk was also found in the barn in midsummer in uncovered vessels, and in each portion of milk there were numerous flies. Hogsheads of sour brewery grains were kept in the barn, and the place was in need of

whitewashing. The employees were indifferent to the care necessary to the proper handling of milk.

This is a type of an objectionable dairy. Little wonder that this man's customers found dirt in the milk and complained of its taste and keeping qualities. One milkman was discovered filling milk bottles upon the street, and some days, it was alleged, he used his hands for a funnel while engaged in this work. Other illustrations might be cited, but the above will suffice to demonstrate the need of increasing diligence in dealing with both problem and individuals. In no other manner can lasting and progressive improvements be obtained.

Dairy Inspection.

Action has been taken in every instance upon the information furnished your Board by the Massachusetts State Board of Health concerning unsanitary dairies. These facts were forwarded by your Board to this Bureau for adjustment. The milk from these dairies was being sold in this city, and the surroundings or conditions were such as to prohibit the production of clean, palatable milk.

The unsanitary features covered a wide range and included dirty cows; necessity of general cleaning of barn and premises or cleaning of tie-up; keeping of pigs under or near the barn—these animals were usually fed on swill, and in many instances generous portions of this food in a putrid condition was scattered about the premises; keeping of horses with cows; lack of milk room; drainage of cow yard or premises in vicinity of barn; insufficient light; overcrowding of cows; and for the presence in the barn of fermenting or sour brewery grains.

Many of these farms, and especially those where swill was being fed to pigs, were in the vicinity of Boston, and the milk was transported to this city by teams and sold by milkmen. The other dairies were a greater distance from this city, some being out of the State, and the milk was purchased by contractors and transported to Boston by railroad.

In each case the dealers who were selling the product of these objectionable dairies were notified that conditions at the farms would have to be corrected, otherwise the milk could not come to this city; *i.e.*, the responsibility for the condition of these dairies was placed upon those selling the product. Reports were later received from these milkmen. A majority indicated compliance with the requirements upon the part of the dairymen, but some of the latter

preferred to cease producing milk rather than make the necessary changes. In a few instances, milkmen stopped purchasing the product of dairies where the proprietors resorted to dilatory tactics or refused to better conditions. At eight of these places the proprietors either sold all of their pigs or moved them from the immediate vicinity of their barns. One gratifying result of this campaign was the erection of several new cow stables.

A summary of the work follows:

Number of unsanitary dairies	99
Number of dairies reported as complying with conditions,	76
Number of dairies where no improvements were made and milkmen stopped purchasing the milk	11
Number of dairies where the cows were sold and the business of milk production abandoned	7
Number of dairies where the presence of tuberculous cows was suspected, and where the milk was excluded until the cows were either disposed of or their freedom from tuberculosis was demonstrated by the tuberculin test .	5
	99

Undesirable Dairies.

About the worst type of place used for milk production to be found in the vicinity of a large city is that of an abandoned estate which has been allowed to go to ruin because of lack of interest of former or present owners, or by reason of the enormous expense involved in keeping the buildings — of which there are usually many — in repair. With such a plant as the above leased to an alleged dairyman, whose only object is to get as much financial return from his occupancy as possible, a combination is furnished difficult to excel from the standpoint of unfitness for the raising of milk. The temperament of the individual who leases an estate of this kind is usually such as to render the production of milk under proper conditions impossible; and where the producer possesses willingness, either his financial state or the terms of his lease ordinarily operate against sufficient repairs to fit the place even for producing a fair grade of milk. The list of indictments which might be lodged against these places on the score of unsuitability is seemingly never-ending. Ordinarily they possess only one praiseworthy feature, and that is proximity to customers, rendering the delivery of milk of comparative freshness possible. But to offset this there is the employment of tumble-down buildings with rotting and defective tie-ups for the cattle, an

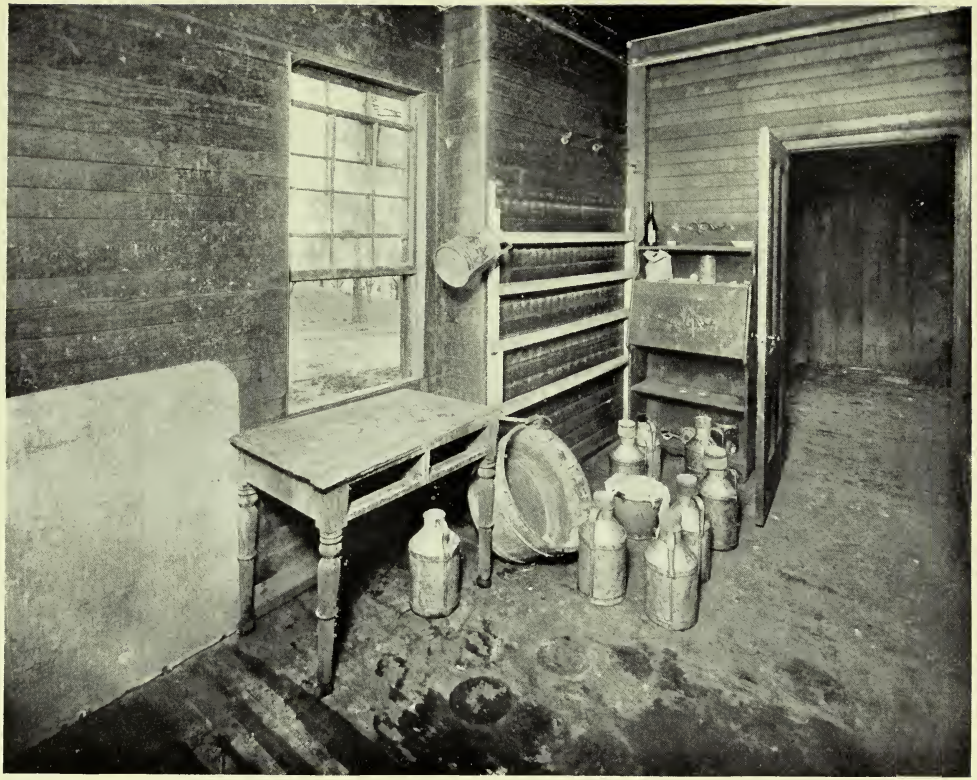

FIG. 1. — MILK ROOM WITH TUB AND BRUSH USED FOR WASHING MILK BOTTLES. MILK PAIL AND STRAINER UNWASHED, AND CANS CONTAINING SOUR MILK DRAININGS.

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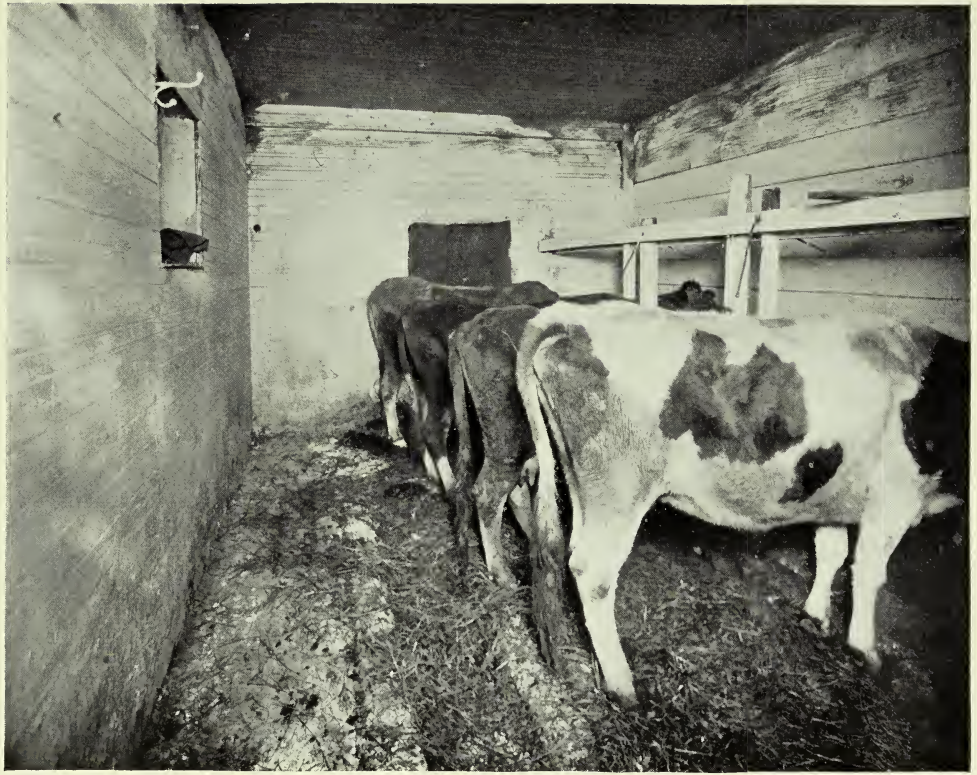


FIG. II. — ROOM IN STABLE IN WHICH FOUR EMACIATED COWS WERE HOUSED.

FIG. III. — MAIN PORTION OF STABLE, USED FOR HORSES AND A FEW COWS. COW PARTIALLY COVERED BY BLANKETS HAD A BROKEN LEG.

FIG. IV. — FILTHY COW YARD WITH STAGNANT POOLS OF WATER. COW SHED APPEARS ON RIGHT OF PICTURE.

FIG. V. — COW SHED, DEFECTIVE FLOORING AND DRAIN, AND GENERAL RUN-TO-RUIN POLICY.

FIG. VI. — END OF COW SHED AND UNPROTECTED MANURE PILE. MUCH OF THE VALUABLE PORTION OF THE MANURE WASTED THROUGH ACTION OF RAIN.

FIG. VII. — OWNER OF THE DAIRY AND EMACIATED COW.

abundance of dirt and cobwebs, usually in winter filthy cows, inadequate water supplies and oftentimes no arrangement for heating water for cleansing utensils, lack of ice, absence of or poorly adapted milk room, and bottling of milk by not over-clean children. Not infrequently other animals are kept near or are allowed to run about the tie-ups.

At one of these places where there was a scant water supply, a sample of the water which had been used in cleaning milk bottles was found to contain about 4,000,000 bacteria to the cubic centimeter, and there was no indication of facilities for the subsequent employment of rinsing water in removing traces of the above heavily laden bacteriologic fluid from the bottles. At the same establishment a straining cloth was being used which from lack of cleanliness and abundance of odor would play havoc with the best milk supply extant.

The regulation of these places offers a problem of much difficulty, for even though the proprietors are compelled to put their buildings in passable condition, constant attention is necessary to assure the production of milk in accordance with modern requirements. The regulation of individuals, which has so much to do with sanitary milk supplies, is a more serious problem than that of surroundings. To illustrate conditions at one of these leased farms, the following photographs, which were taken subsequent to the lessees being notified to improve the condition of this establishment, are reproduced:

Figure I. — Figure I. is that of the milk room located in one corner of stable. On the day of the first inspection, the tub which serves for holding the water used in washing milk utensils was half-full of dirty water; there were no conveniences for rinsing the bottles or cans after washing or for heating the water used in cleansing. There was no ice about the premises, nor was any pretence made to cool the milk other than to place the cans in an open well, which was in the cow yard. The cans shown contained sour milk drainings, and the pail and strainer were left unwashed to await another milking.

Figure II. — This represents the room opposite the milk room. In this room, which is 11 feet by 14 feet by 10 feet high, and ventilated by a window, 20 by 24 inches, from which a part of the glass had been broken, four emaciated cows were kept. These cows were not giving milk, and they were classified as "springers" by the proprietor, who asserted that their physical condition was due to a desire on his part to prevent the animals having "milk fever." The room had been recently whitewashed.

Figure III. — Figure III. shows the main portion of the stable where the horses and a few of the cows were kept. It also

serves as an infirmary, for the cow whose head appears underneath the blanket had a broken leg. Some old harnesses and the dilapidated pail used in whitewashing operations are shown in this picture. The place was ventilated only by doors at either end of the stable. Opposite the stalls, on the day before these photographs were procured, a dead dog was found.

Figure IV. — Figure IV. is that of the cow yard, and its mucky, dirty, untidy and moist condition is well depicted. It was impossible for man or beast to cross this yard and keep clean. At one end of the enclosure was the well previously mentioned under Figure I. The main body of the cows were housed in the shed which appears at the right of the picture. Attempts at natural ventilation are disclosed.

Figure V. — Despite the recently whitewashed walls, the dilapidated character of the cow shed is manifest. The place was lighted by a few small windows and by means of the space, partially closed by burlap, at the end of the shed. Through this space the cow manure was thrown. There were many cracks and holes in the walls beside those which appear in the picture. The drain for conveying the urine away was defective, and the ground in many places was well soaked with this excreta. The odor was repugnant to a good milk supply. Some of the cows were extremely filthy.

Figure VI. — In Figure VI. the end of the cow shed and the space closed with burlap for removal of the manure are shown. This manure pile was a veritable sea of filth, unprotected from the elements, and the soluble portion was allowed to escape down the near-by hillside. Thus much of the valuable property of the manure was wasted.

Figure VII. — The proprietor of the establishment and one of the emaciated cows (a "springer") appear in Figure VII. The raiment of the former shows the result of recent whitewashing operations. At the end of the stable one sees the window of the milk room.

Bacteriologic Examination of Milk.

From the mere standpoint of figures, the results from the bacteriologic examination of milk samples from contractors is not as satisfactory as in former years. Despite this adverse showing, however, it cannot be gainsaid that progress has been made during the last year towards a cleaner milk supply, and that greater efforts were put forth to suppress filthy supplies than in any previous year since the movement for clean milk began. An important influence upon the number of samples from this source failing to comply with the standard of 500,000 bacteria per c.c., is the fact that more samples than usual were collected during the warm months of the year when the bacterial content is highest. In this respect the work is not as indicative of the quality of the milk from

contractors as were the samples collected during 1905 and 1906. Another factor affecting percentage results is that fewer samples were collected from contractors who are endeavoring to better their product, and whose work in this direction is meeting with success. In 1907, 761 warnings were issued to dealers for milk of high bacterial content; 299 of these notices were sent to contractors, and by the latter were subsequently forwarded to producers in the country. The total samples collected from contractors were nearly 1,000 less than in 1906. While the percentage of samples containing under 100,000 bacteria to the c.c. was considerably less than that of the previous year, the percentage of samples complying with the standard (500,000 bacteria per c.c.) is only 6.28 per cent. under that of 1906. Table I. indicates the character of milk obtained from contractors.

Table I. — Bacteriologic Examination of Milk Samples from Contractors. Taken from Cars on Arrival.

Bacteria per Cubic Centimeter.	Number.	Per cent.
Under 50,000	1,301	46.87
50,000 to 100,000	633	22.80
100,000 to 200,000	179	6.40
200,000 to 300,000	91	3.27
300,000 to 400,000	57	2.53
400,000 to 500,000	51	1.83
Total under 500,000	2,312	83.70
500,000 to 600,000	47	1.69
600,000 to 1,000,000	109	3.93
1,000,000 to 3,000,000	164	5.90
3,000,000 to 5,000,000	61	2.23
5,000,000 to 10,000,000	46	1.32
Above 10,000,000	37	1.23
Total above 500,000	464	16.30
Total	2,776	100.00

Of these specimens 83.7 per cent. were within the Board's standard, and 16.3 per cent. exceeded this limit.

These results show a large percentage of samples with high bacterial content, many with over a million bacteria per cubic centimeter. Much of this milk was undoubtedly from dairies where undesirable conditions prevailed. The figures demonstrate the necessity of eliminating the product of these

dirty dairies. Milk only from the highest class of farms should be given the public. Those who are dealing in milk should have such an oversight of the product supplied to consumers as to be cognizant of what dairies are furnishing milk of commendable quality. Clean dairies should be given the preference under all circumstances. No milkman, with consideration for the well-being of consumers, or who is guarding his own interests from a business standpoint, can afford to furnish milk of any other type. Dairymen who persist in the dirty milk policy after ample warning should be made to suffer the quick penalty of inability to market their product.

Table II. — Bacteriologic Examination of Milk Samples from Individual Contractors. These Specimens Considered collectively in the Preceding Table.

Bacteria Per Cubic Centimeter.	A		B		C		D		E		F		G	
	Number.	Per Cent.	Number.	Per Cent.	Number.	Per Cent.	Number.	Per Cent.	Number.	Per Cent.	Number.	Per Cent.	Number.	Per Cent.
Under 50,000	63	68.38	239	48.88	190	51.33	106	55.28	248	49.60	222	38.28	233	42.05
50,000 to 100,000	13	15.00	122	24.98	91	24.40	32	16.97	149	29.80	109	18.80	117	21.12
100,000 to 200,000	6	6.33	20	4.08	22	5.98	13	6.80	24	4.80	40	6.90	54	9.74
200,000 to 300,000	4	4.13	14	2.86	7	1.91	5	2.62	19	3.80	24	4.14	18	3.24
300,000 to 400,000	2	2.06	10	2.04	6	1.72	5	2.62	6	1.20	16	2.75	12	2.16
400,000 to 500,000	.....	.....	7	1.43	7	1.91	7	3.66	4	.80	15	2.58	11	1.96
500,000 to 600,000	.....	.....	5	1.02	9	2.43	2	1.05	1	.20	12	2.07	18	3.24
600,000 to 1,000,000	.....	.....	14	2.86	7	1.91	13	6.80	16	3.20	27	4.65	32	5.70
1,000,000 to 3,000,000	3	3.05	32	6.55	11	2.99	5	2.62	15	3.00	57	9.83	41	7.40
3,000,000 to 5,000,000	1	1.05	11	2.24	8	2.16	2	1.05	12	2.40	20	3.45	7	1.25
5,000,000 to 10,000,000	.....	.....	10	2.04	5	1.35	.....	.....	4	.80	24	4.14	3	.54
Above 10,000,000	.....	.....	5	1.02	7	1.91	1	.53	2	.40	14	2.41	8	1.60
Total under 500,000	88	95.90	412	84.27	323	87.25	168	87.95	450	90.00	426	73.45	445	80.27
Total above 500,000	4	4.10	77	15.73	47	12.75	23	12.05	50	10.00	154	26.55	109	19.73
Total	92	100.00	489	100.00	370	100.00	191	100.00	500	100.00	580	100.00	554	100.00

Table II. indicates the character of the samples from the individual contractors. The milk from only two concerns, namely, "A" and "D," denote an improvement over 1906. The milk from firm "A" indicates an increase in the percentage of samples with less than 50,000 bacteria per c.c., while that from "D" shows a slightly higher percentage of specimens with over 50,000 bacteria to each c.c. The percentage of samples containing more than the permissable number of bacteria per c.c. is of interest. For the individual firms, from 4.10 to 26.55 per cent. of samples above the standard is indicated. The concerns with three highest percentages of samples over 500,000 bacteria per c.c. are those making a specialty of "commercially pasteurized" milk. The bulk of the samples from these firms was procured before the product had been thus processed. In at least one instance this high percentage of samples with large bacterial content is directly attributable to the introduction of "pasteurizing" machinery. Since the advent of this renovating outfit there has been a material lessening in attempts to procure clean milk from producers, reliance evidently being placed upon a temporary heating to make a stale, dirty product salable. This fact is worthy of note as indicating that in this instance at least "commercial pasteurizing" is inimical to the movement for clean milk.

Chart I. shows the comparative bacteriologic standing of the various contracting firms for 1905, 1906 and 1907; also the percentage of infected specimens from the companies for the same years. While there has been a decrease, as previously stated, in the percentage of specimens above the bacteriologic standard with most of the concerns, improvement is to be noted in a few instances. The diminution in infected samples is pronounced, and it will be observed that there has been a constant decrease in the percentage of these abnormal milks. While to the degree just indicated the samples from contractors were not as good as in the preceding year, the wagon and store specimens indicate improvement over 1906. The causes directly assignable for this result are that more samples were procured from these sources during periods of low temperature and that the ice supply was more abundant than in 1906. It is possible also, and to be hoped, that the betterment is in a measure due to increased efforts to procure clean milk and to the methods of caring for it prior to delivery to consumers. As has been mentioned in previous reports, much of the increase in bacteria, from the time of arrival of the milk to its being found upon wagons and in shops, is due to

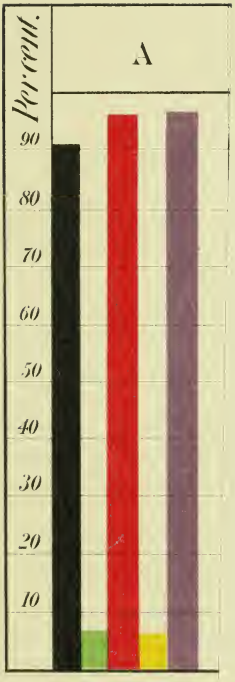
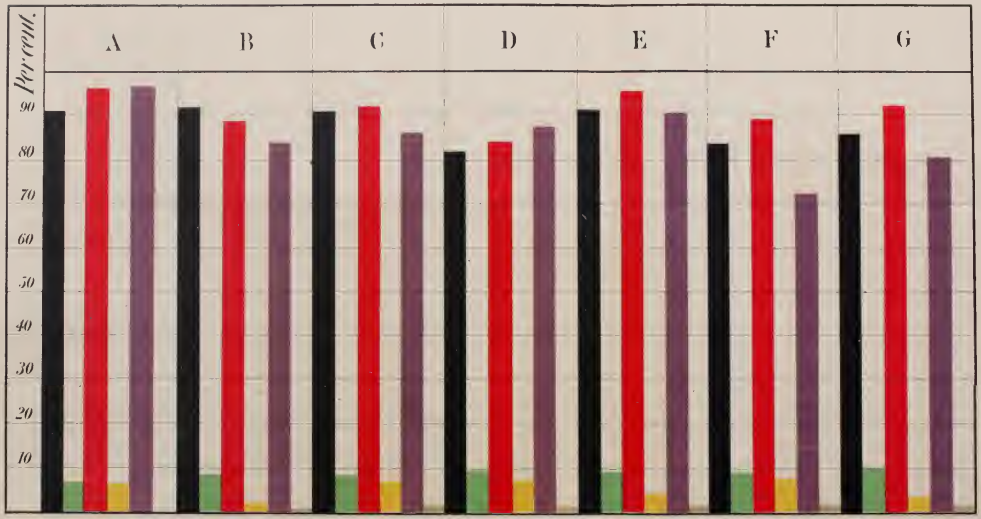

Per cent.
A
90
80
70
60
50
40
30
20
10

CHART No. 1

INDIVIDUAL CONTRACTORS' SAMPLES
1905-1906-1907
Percentages of specimens under 500,000 bacteria
to the c. c., and of infected milk



Percentage of Milk under 500,000 bacteria, 1905
" " Infected Milk, 1905 . . . . .
" " Milk under 500,000 bacteria, 1906
" " Infected Milk, 1906 . . . . .
" " Milk under 500,000 bacteria, 1907
" " Infected Milk, 1907 . . . . .

methods of handling and to its being stored nearly twenty-four hours awaiting delivery. A part of the blame for this ageing of milk has been correctly placed upon the consumer, for without this storing the cream would not all have arisen to the top of the milk, a condition unsatisfactory to consumers. At the same time it must be admitted that milkmen who are conducting their business upon modern methods are much better equipped for the storing of milk and keeping it at a low temperature than are many consumers. Furthermore, if the milk was delivered upon the day of arrival (based upon the time that milk reaches the city by railroad at the present time), a portion of the milk would have to be kept by the consumer for use upon the following day. In this connection a significant factor must be considered, namely, that some consumers do not use ice even in summer, and that some of those who buy ice are without ice chests in which to store or properly refrigerate their milk. Complaints as to sour milk have actually demonstrated these conditions during the last summer. Furthermore, it is doubtful if the milk, when placed in the ice chest of the consumer, is kept as cold as when it is in the refrigerators of the milkmen, where in most instances it is packed in ice.

Of the wagon samples examined during the year (Table III.) 59.73 per cent. were found to contain less than 500,000 bacteria to the c.c., and 40.27 per cent. exceeded this number, while 34.82 per cent. were under 100,000 bacteria per c.c. In 1906, 52.21 per cent. of wagon specimens were within the standard, but only 25.73 per cent. of these samples contained less than 100,000 bacteria to the c.c.

Table III. — Bacteriologic Examination of Milk Samples from Wagons.

Bacteria Per Cubic Centimeter.	Number.	Per cent.
Under 50,000	237	22.44
50,000 to 100,000	136	12.38
100,000 to 200,000	87	8.34
200,000 to 300,000	74	7.00
300,000 to 400,000	45	4.36
400,000 to 500,000	55	5.21
Total wagon samples under 500,000	634	59.73
500,000 to 600,000	48	4.65
600,000 to 1,000,000	113	10.81
1,000,000 to 3,000,000	137	13.07
3,000,000 to 5,000,000	55	5.21
5,000,000 to 10,000,000	36	3.41
Above 10,000,000	33	3.12
Total wagon samples above 500,000	422	40.27
Total	1,056	100.00

Although the examination of store milk (Table IV.) denotes an improvement over 1906, it is evident that this old, exposed and multi-handled milk, even at its best, is unsuited for certain purposes, such as food for infants. The results obtained with this type of milk for the years 1905, 1906 and 1907 demonstrate this fact conclusively. Of the examinations for these three years, the samples of 1907 were most favorable to shop milk. Despite this fact, however, only 10.86 per cent. of the specimens were found to have less than 100,000 bacteria per c.c. The comparative figure for 1907 shows only 4.26 per cent. of the milk from stores with less than 100,000 bacteria to the c.c.

Table IV. — Bacteriologic Examination of Milk Samples from Stores.

Bacteria Per Cubic Centimeter.	Number.	Per cent.
Under 50,000	35	6.66
50,000 to 100,000	22	4.20
100,000 to 200,000	40	7.62
200,000 to 300,000	31	5.90
300,000 to 400,000	27	5.15
400,000 to 500,000	34	6.47
Total store samples under 500,000	189	36.00
500,000 to 600,000	35	6.66
600,000 to 1,000,000	91	17.34
1,000,000 to 3,000,000	118	22.47
3,000,000 to 5,000,000	50	9.53
5,000,000 to 10,000,000	29	5.53
Above 10,000,000	13	2.47
Total store samples above 500,000	336	64.00
Total	525	100.00

Thirty-six per cent. of the store samples complied with the standard. These findings, in addition to the other results, are sufficient for the condemnation of store milk for infant feeding. Those who use, advise, or tolerate the employment of shop milk for this purpose are tempting fate unnecessarily. Its use as food for babies warrants the severest censure. Even with "commercially pasteurized" milk which is now sold to some extent in stores, the bacterial content remains alarmingly high. Of 73 samples of this heated milk collected in 1907, only 34.25 per cent. was found to be under the

bacteriologic standard of the Board of Health. The percentage of this grade of milk complying with the requirement is less than that of unheated store milk; it must also be borne in mind that the bacteria remaining in this "commercially pasteurized" milk, and not destroyed by the ordinary mode of heating, may subsequently produce changes which would cause the milk to be a greater source of danger than if it had not been subjected to this renovating treatment. Milk thus processed should be distinguished by label so that consumers may be aware of what they are purchasing.

Table V. — Bacteriologic Examination of Pasteurized Milk from Stores.

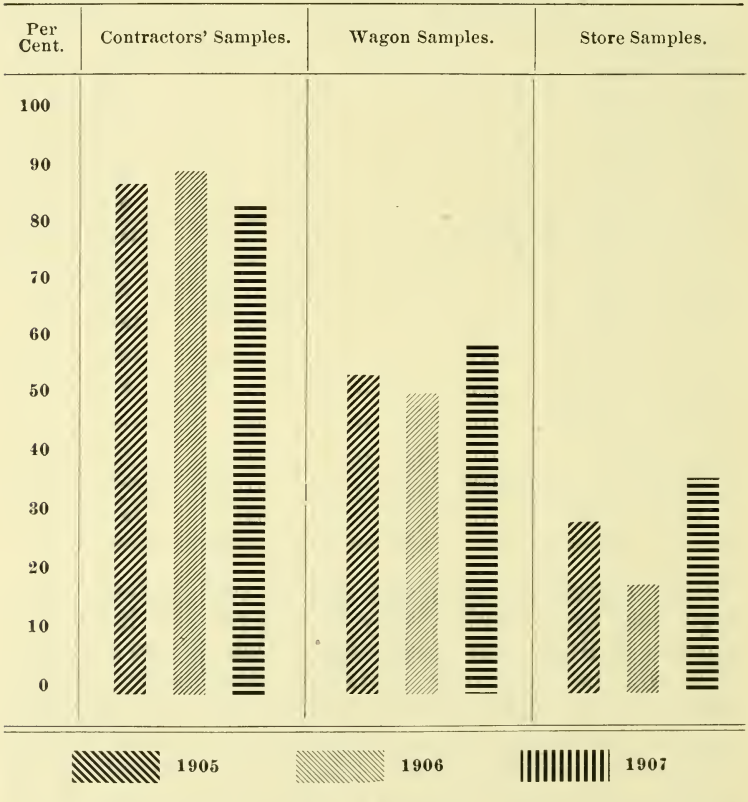
Bacteria Per Cubic Centimeter.	Number.	Per cent.
Under 50,000	3	4.12
50,000 to 100,000	7	9.59
100,000 to 200,000	1	1.36
200,000 to 300,000	3	4.11
300,000 to 400,000	5	6.85
400,000 to 500,000	6	8.22
Total samples under 500,000	25	34.25
500,000 to 600,000	5	6.85
600,000 to 1,000,000	13	17.82
1,000,000 to 3,000,000	25	34.24
3,000,000 to 5,000,000	3	4.12
5,000,000 to 10,000,000	.....	.....
Above 10,000,000	2	2.72
Total samples above 500,000	48	65.75
Total	73	100.00

While custom demands that milk be sold in shops, and a large quantity is required daily for this purpose, it is only a question of time when the number of these places dealing in milk will be materially curtailed. Satisfactory progress towards better milk supplies cannot be made without eliminating as one factor of improvement the undesirable shops now dealing in this product. Solely on the ground of personality, many of the proprietors of these objectionable places indicate their unfitness to care for milk or appreciate the necessity for its proper supervision. Progress towards cleaner milk supplies could be made with greater speed by adjusting the question upon the score of temperament,

rather than by rule or regulation. But such application ought not to be confined to shopkeepers; it should include all who have to do with milk production or handling.

In addition to the bacteriological examinations previously enumerated, 179 samples of milk were tested which may be designated as unclassified specimens. These were from a variety of sources, and some of them had not been properly cared for previous to examination. Despite this fact, 65.56 per cent. had less than 500,000 bacteria to the c.c.

The diagram which follows indicates the comparative percentage of samples from contractors, wagons and stores for 1905, 1906 and 1907 which comply with the regulation of the Board of Health:



The contractors' column shows the condition of the milk as it arrives from the country; the wagon and store samples are for the most part of milk being supplied to consumers the day following its receipt in this city. An improvement

for wagon and store milk over previous years is noted, but the contractors' milk fell below the percentages of previous years.

Milk Contaminated with Pus and Streptococci.

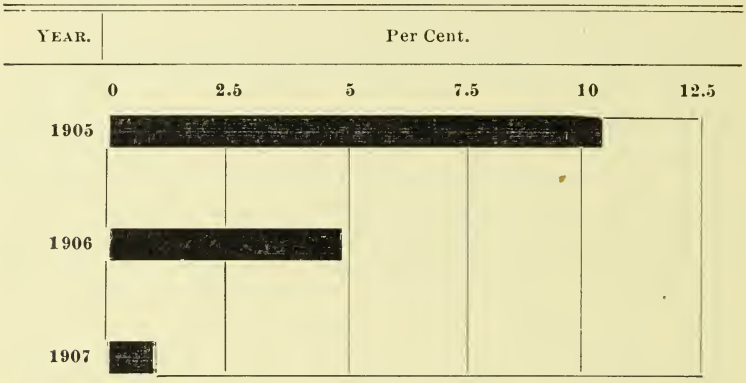
The supply of the past year has been unusual in its comparative freedom from pus and streptococci organisms, and while it is probable that the percentage of contaminated samples is below that of the average year, the continuous decrease in amount of this infected milk during the period in which these examinations have been made (1905, 1906 and 1907) is worthy of note. This condition followed the policy of excluding infected samples which has been in vogue during the above years. Of 4,609 samples examined during the year, only 52, or 1.1 per cent., showed infection. The results by months are indicated in Table VI.

Table VI.

Month.	Total samples examined.	Number containing pus.	Number containing pus and streptococci.	Number containing streptococci.	Per cent. of milk infected.
February, 1907	197	.....	.....	7	3.5
March	479	.....	1	7	1.7
April	471	3	.....	2	1.1
May	465	.....	.....	.....	.....
June	484	2	.....	6	1.7
July	413	1	.....	1	0.5
August	322	.....	.....	1	0.3
September	344	.....	.....	.....	.....
October	418	3	.....	3	1.4
November	236	2	.....	1	1.3
December	275	3	.....	2	1.8
January, 1908	505	2	.....	5	1.4
Total	4,609	16	1	35	

The comparative percentage of milk thus infected for the years 1905, 1906 and 1907 is shown in the diagram which follows. In 1905, 5,559 samples were examined, and 583, or 10.48 per cent., were contaminated. During 1906, of 5,007 specimens, 246, or 4.9 per cent., were reported for

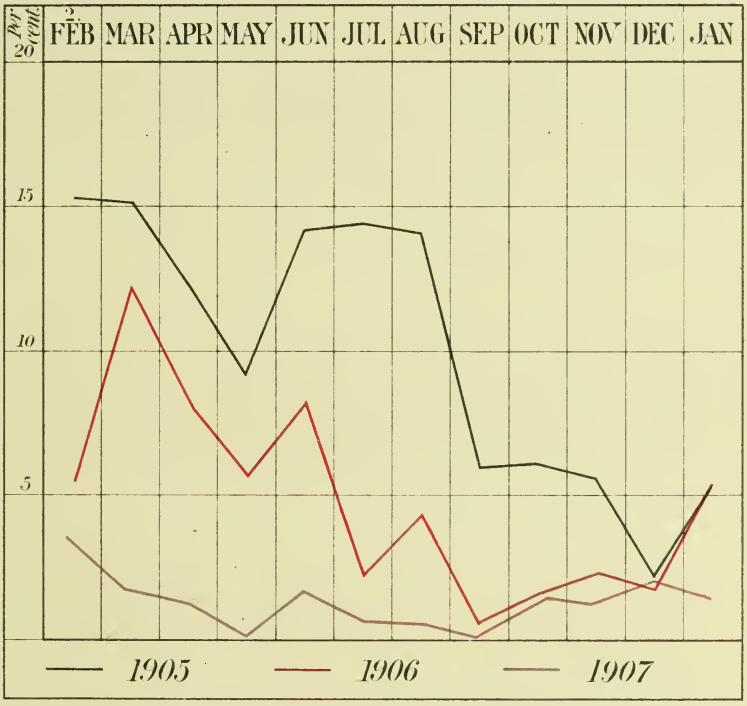
their pus, pus and streptococci, or streptococci content. The figures for 1907 appear above.



No doubt the attitude of those contracting firms, earnestly engaged in detecting and eliminating infected milk, has been a significant factor in this reduction. These concerns, upon ascertaining, by examinations in their own laboratories, that there is evidence of infected milk at the dairy, insist upon its being kept from the supply sent to this city. The contractors also aid producers in ascertaining what animals are responsible for the unsound milk.

An encouraging indication is that there appears to be less opposition at present to the exclusion of infected milk than has been evidenced hitherto over this prohibiting mandate. Even the producers are more willing to render aid in placing the blame upon the animals at fault. What is desired, however, is that dairymen exercise more care in observing the condition of their stock, and keep from the marketable milk the product of unhealthy cows, and of cows just prior to or subsequent to the calving period. Such a course would be preferable to that of including milk from such animals in that of the daily supply and trust to its escaping detection by milkman or consumer. Apparent abnormality in cows, such as certain forms of udder trouble, afford ample warning to the observant dairyman that the milk is likely to be unwholesome, and that in all fairness to purchasers and consumers it should not be offered for sale. While present methods afford a means of detecting these infected milks, the producers should not await the result of such examinations, but should take the initiative in withholding milk from all suspected animals. It is nothing short of criminal for producers to permit these abnormal milks to be used by the public, and especially is this so where the unhealthy

CHART No. 2



1. See Chart No. 1 for percentage of infected milk for 1905, 1906 and 1907 from Contractors only.
2. The official year begins February 1.

condition of the animals is obvious. Dependence should not be placed wholly upon the authorities to guard the interest of the consumer in these matters. It is to the advantage of the producer to render all possible assistance, even if it entails a temporary pecuniary loss from throwing away a small amount of milk. In the end it means a greater market for his product, for public confidence in a milk supply means a demand for increased quantities of this fluid. While the greatest responsibility in this matter of unwholesome milk rests with the farmer, for he is the one constantly at the producing end, contractor, milkman, and all others having to do with providing public milk supplies, should render all possible assistance in protecting consumers from the milk of unhealthy animals. This is demanded by both law and decency.

The comparative percentage of infected milk for the years 1905, 1906 and 1907 is shown by Chart II. In May and September none of this objectionable milk was found. December was the only month of the year in which no improvement was shown over 1906.

That the amount of this infected milk might be materially decreased is fully evidenced by the results of investigating the finding of pus or streptococci or pus and streptococci in milk samples collected in this city during the years 1905, 1906 and 1907. These reports followed the sending of warning notices to dealers concerning the quality of the milk. Where the milk was collected from contractors these notices were sent to the latter and subsequently forwarded to the producers. The data obtained in endeavoring to account for these abnormal milks was procured for the most part through the assistance of the contractor. Experience has demonstrated, however, that it is impossible to obtain the facts in each instance without personal investigation, and for several reasons that course has been impossible. The list which appears below offers ample evidence, however, that much of the infected milk of the last year might have been excluded by dairymen who were both observant and considerate of the public welfare. In some instances negligence was apparent, but in others positive disregard of the consumers' interests was manifest. To those who aided in procuring the information much credit is due. The results for 1905 and 1906 have been previously published; those for 1907 follow:

1. Drying off three cows; they were being milked only once a day.

2. One cow had occasionally given bloody milk, and it was thought that some of this milk became mixed with the supply sent to market. By an examination of the remaining cows in this herd it was found that two of the animals had swollen throat glands; another had a bunch upon the udder, and the respiration of four cows was abnormal. The product of five cows was ordered excluded from the milk sent to market.

3. One cow nearly dry. Other cows being fattened and giving only two to three quarts of milk daily.

4. Cow reported as gargety. It was subsequently ascertained that this cow was a poor milker, "not giving milk freely." To obviate the difficulty, a spring lance was inserted in the cow's teats. The lance was then opened and drawn through the teat for the purpose of removing any obstruction. After this operation blood flowed from the teats for several days. Later the milk was supplied to consumers and an examination disclosed its abnormality.

5. Gargety cow.

6. Cow with inflamed udder.

7. Two cows nearly dry.

8. One cow with a swollen udder and with respiration slightly above normal.

9. One cow with a weak quarter; another cow was found to have a "fallen hip."

10. Gargety cow.

11. Cow with caked udder.

12. The milk from seven cows about to calve was being sent to market.

13. One cow with a "puff boil" and swollen udder.

14. Two cows of a herd of fifteen animals were giving milk containing much pus. The producer was told to keep the milk from these animals out of the supply. He refused to comply with this requirement; stopped sending his milk to this city, and immediately began selling it in a city in an adjoining State. Evidence as to the condition of the cows was unobtainable, but it was learned that the cow barn was very dirty and in need of thorough cleaning, and that horses were kept in the barn with the cows. There was an abundance of ice on hand, but it was not being used, and the milk was improperly cooled. The Inspector of Milk of the city to which the milk was being shipped was notified of the existing state of affairs, and immediate action was promised.

Efforts of Dealers to Improve Milk Supplies.

During the year the various contracting firms made 29,208 bacteriologic examinations of milk in the endeavor to ascertain the quality of their supplies. Of this number, 928, or 3.17 per cent., were classified as containing pus or streptococci. Where the milk was found to have a high bacterial

content notices stating that fact were sent to producers, and the latter were also notified of the necessity of having their milk comply with the requirements of the Board of Health. One concern sends notices to farmers where the number of bacteria reach 250,000 per cubic centimeter, and all milk found by this firm to have above 100,000 bacteria per cubic centimeter is pasteurized and used for cream and butter. In instances where pus and streptococci were present in milk, the progressive concerns procure samples from the individual cows in each herd, and in this manner locate the cause of the trouble. The milk from the cows at fault is withheld until such time as the milk appears normal. One firm endeavors to learn the condition of the cattle by means of inquiry blanks, and an inspector also makes examinations of herds from which abnormal milk is procured. Two of the small companies employ veterinarians to examine faulty herds. Other dealers, on finding this abnormal milk, notify their producers to stop sending further supplies.

All of the contracting firms agree that the bacteriologic work of the last three years in connection with the milk supply has resulted in a marked improvement. One firm states that the amount of sour milk has been reduced 70 per cent. Another firm says that the work of bettering the condition of milk has brought a reduction of 17 per cent. in dairies with milk containing over 500,000 bacteria per cubic centimeter; a reduction of 12 per cent. in dairies with milk having temperatures above 50 degrees Fahrenheit; and a reduction of 12 per cent. in dairies with milk indicating pus. These figures are significant, and demonstrate possibilities where the work of improvement is judiciously planned and persistently and intelligently executed.

The last year has witnessed a greater effort on the part of contractors to better conditions at the place of production than has been made hitherto. The dairies are visited by inspectors who endeavor to point out undesirable conditions, and to educate the farmer to the necessity of more care in milk production. This work is carried on persistently by some firms and by others spasmodically. In some instances members of these concerns visit their dairies. Two firms have commenced using score-cards. Where the milk is persistently faulty, producers are notified to stop sending the milk. This course is also followed by other dealers where designated improvements are not made. Meetings for discussions with producers have been held, and literature upon the clean and cold milk subject has been freely employed. One concern reports but few instances where producers were

not supplied with ice. This firm also finds much improvement in the health and cleanliness of the cows, also that there has been a pronounced betterment in the barns from the standpoint of cleanliness and light. The employees of this concern are subjected to examination by a physician, and a system is in force for reporting any symptom of a contagious disease.

Two firms have greatly improved their transportation facilities by the introduction of refrigerator cars. By their use milk can be transported in much better condition than in the old style of car.

The necessity for care in the production and handling of milk, while of greatest importance from the influence upon the health of human beings, is not insignificant from the standpoint of waste of food or monetary loss. During 1907 fully 300,000 quarts of milk, nearly a day's supply, arrived in this city in such condition from sourness or other causes as to be unsalable. Of course this was not a total loss, as the cream could be made into butter. Market milk cannot be so utilized economically, however, and the shrinkage in value with the above quantity of milk, when converted into butter, undoubtedly amounted to nearly $7,000, a loss which might have been prevented by caring for the milk properly.

Low Temperature an Important Factor.

Low temperature will always be a necessary feature in the maintenance of good milk supplies, but some producers remain indifferent to this fact, and give very little, if any, attention to refrigeration. No dairy can be considered properly equipped without an abundant supply of ice, and with an owner possessing the required temperament and knowledge to properly cool this important product. Despite this fact, there are milk producers in New England who make no pretence of using or storing ice for this purpose, and there are other farmers who employ it so sparingly, or with such indifference, as to accomplish little good. There can be no excuse for New England farmers not having sufficient ice to cool their milk during all high temperature periods throughout the year. There is also evidence of neglect upon the part of many producers who refrigerate their milk during the summer to properly protect their product during the high temperature periods of the fall, winter and summer. The cooling of milk should be regulated by necessity and not by seasons. It is of the utmost im-

portance that milk be chilled as rapidly as possible, and that a low temperature be constantly maintained. This is a responsibility which farmers owe to humanity; furthermore, cold milk is advantageous from the pecuniary standpoint, for with low temperatures the amount of sour milk is lessened and the loss from this source is correspondingly decreased. While the maintenance of a low temperature is important during the time the milk is being transported upon cars, such cooling will not atone for the neglect of the producer. The latter should also use every precaution to protect the milk from the influence of the sun while it is being transported from the dairy to the cars. A covering for the cans will assist in maintaining a low temperature. The time is approaching when dealers will be compelled to refuse milk which has a temperature above 50 degrees Fahrenheit.

It is a fact that more attention is now given to the icing of milk than in previous years. This is due to the agitation of this subject and the increased knowledge of the influence of low temperature in keeping milk sweet. The progress of this cold milk idea has not been as widespread as desired, and there is necessity for further development in this direction. With the maintenance of the proper cleanliness and a low temperature at the dairy, the quality of the milk supply would be materially improved. Good dairying is essential to desirable milk, and no amount of ice or precaution on the part of the milkman will make amends for the neglect of the producer. On the other hand, commendable milk supplies may be readily spoiled by careless or slovenly methods of the dealer. It is essential then that all of those engaged in supplying the public with milk exercise great care in protecting this fluid from all detrimental influences. Milkmen realize the importance of ice, and many in this city, and at a considerable expense, employ it in large amounts in cooling their daily supplies. More care has been used by wagon dealers in the last year to have milk kept cold while it is being held for delivery than in any previous period. Many shops also use large quantities of ice in keeping their milk cold. The dealers who use the least pains in refrigerating milk are the storekeepers who sell milk in limited quantities. Some of these latter make no pretence of cooling milk until compelled to do so, while others are so sparing of ice that little benefit is derived. Only generous quantities of ice will accomplish the object desired; this applies to householders as well as to producers and dealers. During the warm periods of the year many temperature tests were

made. Some temperatures were taken in the country, others as the milk arrived on trains in this city, and many as the milk was being delivered to consumers by wagons or was offered for sale in shops. Warnings were sent for the first violation of the temperature regulation, and in all 216 were issued during the year; 92 of these were forwarded to contractors and represented milk of high temperature just as it arrived from the country. These latter warnings were sent by the contractor to the country. Where warnings proved unavailing, prosecutions were instituted, and in all 20 cases were brought. Fines varying from $10 to $15 were imposed.

Cream.

After the enactment of the law last year, which made it illegal to sell cream having less than 15 per cent. of milk fat, it was found that very few of the dealers were aware of the adoption of this standard. To acquaint them with the requirements of the measure several thousand copies of the law in circular form were distributed. These notices also called attention to the regulations of the Board of Health concerning the standards for bacteria and temperature. The issuing of this circular resulted in an immediate improvement of the low grade creams, and very few samples are now found which do not have the required per cent. of fat. A marked change for the better was also made in the mode of handling cream after its arrival in this city.

The amount of cream sold in the city yearly is very large, and an increased quantity is annually required to supply the demands of the trade. By comparison with ten years ago, the business has developed tremendously in volume, and there were never as many dealers handling cream exclusively as at the present time. In 1907, 791,244 gallons of light cream, containing 17 per cent. to 20 per cent. of fat, and 1,191,492 gallons of heavy cream, containing 35 per cent. to 44 per cent. of fat, were handled by local dealers. Of these amounts 769,438 gallons of the light cream and 489,450 gallons of the heavy cream were probably consumed in this city. These quantities would allow over one gallon of thin cream and over three quarts of heavy cream to each inhabitant during the year.

An attempt was made to ascertain the amount of cream sold in 1902 for comparison with that of last year, and although complete data was unobtainable for 1902, the volume of cream for that year approximated 995,496 gallons of thin cream and 220,900 gallons of heavy cream. The proportion

of this cream consumed in this city is unknown. These figures denote a lessened demand for thin cream and a very marked increase in the amount of heavy cream required by consumers. Probably economic reasons have much to do with this change, for concentrated cream means decreased bulk and a saving in transportation charges.

A large proportion of Boston's cream supply comes from Maine, New Hampshire and Vermont, but some comes from New York and Massachusetts. Creameries are scattered over the above States, and at these establishments the cream is separated from milk or from thin cream purchased from farmers. The milk, or the thin cream, is taken to the creameries by producers or by collectors employed for this purpose. Where the farms are remote from the creameries the thin cream and collector system is employed to a large extent. Where milk is delivered to creameries by producers, the latter usually take back the skimmed milk for use upon the farm. Very little precaution is observed while transporting the milk or thin cream to the creameries for protection against atmospheric changes. A few concerns, however, make use of ice and heavy blankets in an attempt to maintain a low temperature. The States with number of creameries supplying Boston dealers follow:

Vermont	36
Maine	23
New Hampshire	12
New York	9
Massachusetts	4
Total	84

At these creameries the milk or cream is first heated and then passed through separators to remove the cream from the milk and to further concentrate the thin cream. The heat employed varies from 155 to 180 degrees Fahrenheit, but most of the concerns heat from 160 to 165 degrees Fahrenheit. At many of the creameries the heating is only momentary ("continuous"), but at others the heat is maintained for longer periods, the time varying from five minutes to one hour. After heating much of the cream is almost immediately cooled below 50 degrees Fahrenheit, usually to a temperature of from 40 to 45 degrees. At a few creameries the cooling is done in cans immersed in ice water, and a longer period, usually thirty minutes, is required to bring the product to a low temperature. Some of the cream is shipped, packed in ice, in refrigerator cars, but large quantities are trans-

ported by express either in cans boxed and packed in ice or in jacketed cans. The cream arrives in cans of various sizes, the 40-quart can being used to the largest extent. Cans holding 8½, 24 and 41 quarts, respectively, are also employed. Cream is delivered to consumers in jars varying in capacity from one-eighth of a quart to a quart, and in cans holding from 1 quart up to 40 quarts.

Cream is a commodity which is not delivered to consumer fresh. The freshest milk which arrives at any of the above creameries is from 3 to 15 hours old, and the cream from these creameries upon arrival in Boston is from 24 to 48 hours old, and when delivered to consumers is from 36 to 72 hours old. At other creameries the milk upon arrival in summer is from 48 to 72 hours (in winter, 96 hours) old; when this summer cream reaches this city it is from 60 to 84 hours old, and when delivered to consumers 84 to 108 hours old. The above winter cream may be from 120 to 144 hours old, and even older, when delivered to customers.

The inspection given to farms where milk is produced for conversion into cream is inadequate. Only a few of the large firms make any pretence at supervision, and some of these concerns even assert that no attempt is made to control the conditions under which milk is raised for cream purposes. One concern which operates largely with Massachusetts milk guards the farm production by means of a veterinarian and bacteriologist, but where the farms are outside of this State no effort is made by this firm to govern production conditions. A few dealers attempt regulation over farms by returning milk when it is unsatisfactory, or employ a system of rebates with faulty milk. Some of the small concerns frankly assert that they have no control over the dairies or acquaintance with production conditions; in fact, many of these latter firms act simply as middlemen, purchasing their cream from creameries and possessing no knowledge of its preparation, much less of the farm surroundings. One dealer stated that he has never visited the creameries from which he purchases supplies, and that if he attempted to interfere with the creamery or production part of the business, he would be told to procure his supplies elsewhere. The principal reason why so little attention is given to sanitary conditions at the farm and to the health of the cows is that the cream is heated, *i.e.*, commercial or true pasteurization is relied upon to offset farm deficiencies.

Three firms ascertain the quality of their cream by means of bacteriologic tests, and the same number of concerns make examinations for the presence of dirt. Other than the work

of the above firms, and the tests for the amount of fat, there is very little examination of cream by dealers. Most of the sour cream, that which results from surplus stock or is returned by customers, is made into butter; a small portion, however, is sold to the Jewish trade.

Cheese.

During 1906 and 1907 a number of examinations of cheese were made for the purpose of establishing the relation of the fat content to the amount of solid matter. These samples were procured from various sections of the city and well represent the quality ordinarily sold to purchasers. The results, which indicate a preponderance of cheese of the higher grades upon this market, follow:

Cheese.

Number.	Kind.	Price per Pound.	Per cent. of Fat.	Per cent. of Solids.
1	Curd	$0 12	2.10	37.60
2	Sour Milk	06	3.00	22.75
3	Parmesan	pkg. 10	3.60	72.78
4	Curd	05	4.50	42.50
5	"	10	4.50	43.25
6	American	10	9.00	51.60
7	"	12	11.70	59.20
8	Cream	20	13.50	49.07
9	Neufchatel	pkg. 05	18.75	38.15
10	Cream	16	19.50	44.65
11	American	16	22.50	70.50
12	"	18	23.25	61.95
13	"	19	24.00	79.25
14	Neufchatel	pkg. 05	25.50	44.60
15	Cream	pkg. 05	28.50	60.50
16	American	18	30.00	66.30
17	"	20	30.00	72.10
18	"	23	31.50	61.65
19	"	19	31.50	63.90
20	"	16	33.00	62.30
21	"	14	33.00	66.40
22	"	17	33.00	67.40
23	Swiss	.....	33.00	68.60
24	American	18	33.00	70.95

Cheese. — *Concluded.*

Number.	Kind.	Price per Pound.	Per cent. of Fat.	Per cent. of Solids.
25	American	$0 18	33.75	75.10
26	"	17	34.50	63.25
27	"	16	34.50	64.60
28	"	14	34.50	66.40
29	"	20	34.50	70.80
30	"	16	34 50	73.00
31	"	18	34.50	74.30
32	"	16	34.50	77.85
33	"	20	36.00	62.00
34	"	16	36.00	68.00
35	"	17	36.00	69.35
36	"	18	36.00	69.65
37	"	12	36.00	72.50
38	"	20	36.00	73.10
39	"	16	36.00	74.55
40	"	16	36.00	76.20
41	"	16	36.00	79.00
42	"	19	36.00	72.75
43	"	14	37.00	70.10
44	"	20	37.00	70.45
45	"	20	37.50	72.90
46	"	18	38.25	76.00
47	"	39 00	86 80	
48	"	18	39.00	75.70
49	"	18	39.00	76.50
50	"	20	40.00	75.02
51	Cream	pkg. 10	40.50	52.85
52	American	16	42.00	83.70
53	Cream	pkg. 09	44.60	63.00

All of the above samples were found free from foreign fats, and the prices bore no relation to the fat content. Thus of two specimens from the same store: No. 16 contained 30 per cent. of fat and cost 18 cents per pound, while No. 52, with 42 per cent. of fat, cost only 16 cents per pound. Nos. 5 and 6 each cost 10 cents a pound, yet one (No. 6) yielded 9 per cent. of fat and was superior to the other (No. 5) in every respect; the latter contained only 4.5 per cent. of fat. Nos. 1 and 4 show wide differences in both cost and fat content;

No. 1 cost 12 cents per pound and contained 2.10 per cent. of fat; while No. 4, costing only 5 cents per pound, contained 4.5 per cent. of fat. Flavor is an important element in determining the price of cheese, but it is not the sole factor. If the value is based exclusively upon the amount of fat, however, the above figures show that the fat in skimmed milk cheese is much more expensive than the fat in the richer varieties. The food value of cheese, however, cannot be determined solely by the amount of fat.

Two of the specimens of cream cheese were fraudulent, namely, Nos. 8 and 10; they contain an excess of moisture and were evidently made from partially skimmed milk. No. 15 is of better quality, but does not compare favorably from the standpoint of richness with Nos. 51 and 53. Considerable variance is also to be noted in the percentage of fat in the samples of Neufchatel cheese, Nos. 9 and 14.

A law defining the amount of fat which should be in whole cheese, *i.e.*, that made from unskimmed milk, and requiring skimmed milk cheese to be marked so as to indicate its character, would be advantageous. Skimmed milk cheese is a wholesome and valuable food, but it should be sold for what it is and without deception.

Butter.

Although there was not much variance in the number of cases for violation of the renovated butter law, there can be little doubt that the number of dealers in this commodity is gradually decreasing. There are two reasons for the lessening of traffic in this grade of butter, one being the stringency of the legal requirements concerning marking, and the other is the dissatisfaction of customers with the product, rapid deterioration being likely to ensue when it is removed from the refrigerator of the dealer and subsequently kept under ordinary household conditions. Retail dealers in this butter need to exercise great care in plainly marking each package before delivery to purchasers. A supply of marked papers should be kept and employees instructed and made to use them. The retailer who attempts to deal in this butter and leaves the marking of the package until just prior to delivery to the customer is tempting fate, and is likely to be found violating the law, either through intent or forgetfulness of himself or of his agents.

An effort is being made at the present time to have the law requiring the use of the word "renovated" changed so that it may be optional with dealers to use either the designation

"process" or "renovated" in marking packages of this butter. The movement is instigated by interested parties, namely, manufacturers of this product, who believe that the word "process" will be less objectionable to consumers than the present characterization. The bill which has been introduced into the Legislature in the attempt to legalize this change deserves defeat. The word "process" utterly fails to describe this product and would be utilized to defraud and deceive consumers. "Renovated" would be a mild designation if users had the opportunity to observe and smell some of the original stock from which the rejuvenated article is prepared.

There is need, however, for a law in this State limiting the amount of water in butter. Such enactments have been made by other New England States, and Massachusetts should have similar protection from fraudulent goods. During the summer it was ascertained that butter was being remade by one concern in this city in such a manner as to cause the finished product to contain an abnormal amount of water. By co-operation with the Internal Revenue Department, the firm was compelled to abandon the business in this city. The concern then transferred this part of its business to a nearby city, from which a later change was made to a city west of Boston. Meanwhile Massachusetts has no legislation which will prevent the sale of this watered butter. The results from examinations of these watered goods are shown in the following table, together with the prices (the specimens were purchased during the summer) of the samples:

Sample Number.	Price per Pound.	Per cent. of Water.
1	$0 32	20.66
2	36	24.44
3	32	25.38
4	32	26.38
5	32	27.73
6	28	34.75
7	28	36.08

Average pound price, $0.31.
Average per cent. of water, 27.91.

In view of the fact that butter of good quality rarely contains more than fourteen per cent. of water, and that the

average amount of water is less than this figure, specimens with from 20.66 per cent. to 36.08 per cent. are gross frauds, and the subject requires legislative action in order to give the public adequate protection. The reduced amount of fat in watered butter makes the cost to the purchaser excessive.

Although many tests were made for boron compounds in butter and oleomargarine, in no instance was evidence of these preservatives discovered.

Oleomargarine.

The sale of this substance is rapidly increasing. This is largely due to the attitude of the courts in interpreting the color law of this State. Manufacturers have been quick to take advantage of the court's decision whereby "if the color which makes oleomargarine look like butter is incident to the use of materials needful in the production of oleomargarine, it is not coloration from an ingredient put in to cause it to look like butter. In such case it is the oleomargarine itself which resembles butter, and it is not caused to look like butter by a coloration or ingredient added for that purpose."

Makers of oleomargarine under this ruling have shown much cleverness. They now select materials yielding a finished product which from the standpoint of appearance cannot be distinguished from yellow butter, and in which, so far as known, no trace of an identifiable color has yet been detected. This yellow oleomargarine is more pleasing to users, hence its increased employment. The demand has grown to such an extent that there are now thirty-three dealers registered for the sale of oleomargarine, an increase of ten dealers over last year, and eighteen more dealers than were registered for the sale of oleomargarine in 1905.

Oleomargarine of the yellow type is viewed with favor by restaurant and boarding-house keepers. This is demonstrated by the increased number of cases against these establishments where oleomargarine was being served without notifying guests. During the year twenty-six cases were entered for serving oleomargarine in the above manner as against six cases in 1906.

Vinegar.

The inspection of vinegar has resulted in disclosing somewhat more than the usual amount of spurious products. During the year, however, there were indications that some-

manufacturers were more actively interested than hitherto in placing pure goods upon the market. Many New Englanders from custom use for vinegar (or intend to) the product made from cider. This custom is not based on a sound foundation, for the value of vinegar is in the acetic acid, which is the acid present in the various types of vinegar. Thus cider vinegar has no advantages over the other forms, and as some of the latter are much cheaper, from the cost standpoint consumers are at a decided disadvantage in purchasing cider vinegar. There is no substantial reason for encouraging the sale of cider vinegar; in fact, purchasers are less likely to be deceived or imposed upon when buying other varieties. The comparative high cost of cider vinegar is founded upon two reasons, one being the demand and the other scarcity of this product. An expert has recently stated that the demand for cider vinegar exceeded the supply fifty per cent., but whatever the figure there is no doubt that the demand for cider vinegar is largely in excess of production. With this condition of affairs, there is great temptation to supply the difference between production and the amount required by the trade. In fact, this adulteration or extending of pure cider vinegar is practised by many dealers, and the manipulations in most instances are cleverly devised. The methods are planned especially to produce a product which will escape detection by the chemist and meet the approval of users. In the latter respect there is little trouble, and not infrequently the analyst is deceived. Of course this adulteration or extension of cider vinegar is not done solely to supply users with cider vinegar. It yields a substantial profit to the manipulator and at the same time gives him an opportunity to undersell his competitors who are handling the pure article. A typical method of extending cider vinegar is to prepare a compound composed of white or spirit vinegar, boiled cider or apple jelly and acetate of potassium. The cost of this spurious mixture is about four cents per gallon. To this is added an equal quantity of cider vinegar, costing twelve cents per gallon, thus rendering detection more difficult. The cost of the two gallons of finished product would be sixteen cents, or for one gallon eight cents. Thus there is a difference of approximately four cents per gallon between the cost of the finished compound and the pure product —not an insignificant profit. There are other methods of extending cider, but they are crude by comparison with the above scheme. The boiled cider or apple jelly which is frequently employed in cider vinegar adulteration is dealt in by the carload. The product known as boiled cider is

usually true to its name and made by evaporation of cider, but the variety known as apple jelly may be made either from apple pumice (the residue which remains after apples are pressed in making cider), by cooking it with water and subsequently boiling down the aqueous solution, or by boiling apple cores and skins with water and then concentrating the liquid by heat. When the jelly is prepared from cores and skins which have been bleached by sulphur dioxide, the finished product is of a lighter color than when prepared from unbleached cores and skins. There is such demand for these cores and skins that the "apple waste," as it is known, is an article of commerce. A compound is also extensively made from apple waste by first thoroughly steaming it and finally pressing out the liquid portion. This is known to the trade as "apple juice," and is sufficiently dense to be employed in building up "cider vinegar solids" without concentration. This liquid, by evaporation, could be converted to apple jelly. Supply houses exist for furnishing vinegar manufacturers with wares necessary to the preparation of fictitious vinegar. The adulteration is not confined to cider vinegar; any vinegar which has color is never so cheap as to escape the attention of the expert mixer, the idea being to lessen the cost of the product and secure the market from some competitor. Thus molasses or syrup vinegar, which should be made by fermentation, has been imitated by the simple addition of molasses to white wine vinegar. There will always be petty fraud in the retail sale of molasses, syrup and like vinegars for cider vinegar. Such sales are oftentimes made by retailers to regular customers who are known, but when a stranger or person who may be suspected of being a collector of samples attempts to buy cider vinegar, they are met with the statement that there is no cider vinegar in stock, or the vinegar is sold as molasses, or standard, or by some other fanciful designation. Thirty-three vinegar cases were brought to the attention of the courts and all of the defendants were found guilty.

Court Cases.

A summary of the year's prosecutions follows:

For sale, or possession, or custody with intent to sell of milk not of good standard quality . . .	220
For possession with intent to sell of milk containing added water	10
Carried forward	230

Brought forward	230
For sale of cream containing less than 15 per cent. milk fat	2
For possession or custody with intent to sell of watered skimmed milk	1
For milk having a temperature higher than fifty degrees Fahrenheit	20
For sale of milk in vessels not bearing dealer's name, and neglect to transfer to clean vessels . . .	2
For sale of adulterated cider vinegar	5
" " vinegar	9
" vinegar not made from cider as cider vinegar,	16
" " colored with caramel . . .	3
" renovated butter not properly marked .	39
For possession of renovated butter in unmarked tub .	1
For sale of oleomargarine as butter	4
" " unmarked	3
" " not being licensed . .	7
" " in imitation of yellow butter,	4
For furnishing oleomargarine in a restaurant . .	26
	372

The results of prosecutions were as follows:

Number of warrants returned without service . .	5
" cases in which defendants ran away . .	1
" " on file	13
" " dismissed on motion of complainant,	9
" " nol pros'd	6
" acquittals	9
" convictions	329
	372

Income.

The amount paid in fines was . .	$5,037 00
Receipts from license fees . . .	719 00
Total	$5,756 00

Respectfully submitted,

James O. Jordan,
Inspector.

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